



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/087,416 | 02/27/2002 | Jigish D. Trivedi | MI22-1965 | 4704 |

21567 7590 07/25/2002

WELLS ST. JOHN ROBERTS GREGORY & MATKIN P.S.
601 W. FIRST AVENUE
SUITE 1300
SPOKANE, WA 99201-3828

EXAMINER

OWENS, DOUGLAS W

ART UNIT PAPER NUMBER

2811

DATE MAILED: 07/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

10/087,416

Applicant(s)

TRIVEDI ET AL.

Examiner

Douglas W Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 39-49 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 39-49 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,5,6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 38-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent No. 5,596,218 to Soleimani et al. in view of US patent No. 6,225,151 to Gardner et al.

Regarding claims 38, 39, 43 and 45-48, Soleimani et al. teaches integrated circuitry, comprising a substrate (11) substantially devoid of nitrogen atoms and having a plurality of n-type and p-type field effect transistors (Fig. 6), wherein the gate dielectric of the p-type transistors comprise silicon dioxide having nitrogen atoms therein, such that the nitrogen atoms are higher in concentration at only one elevation as opposed to another (Col. 4, lines 19-24). Soleimani et al. does not explicitly teach integrated circuitry, wherein the gate dielectric of the n-type ^{field} ~~filed~~ effect transistor is different in composition from the gate dielectric of the p-type field effect transistor. Gardner et al. teaches that it is beneficial to provide nitrogen atoms as a boron diffusion barrier in p-channel transistors (Col. 11, lines 15-48). Gardner et al. further teaches that nitrogen

atoms near the channel of N-channel IGFETs can have a detrimental affect on the performance of the transistor (Col. 11, lines 64-67). It would have been obvious to one of ordinary skill in the art to avoid including nitrogen atoms in the area near the channel of the N-channel transistors since it is desirable to obtain optimal performance from device formed on the wafer. In other words, it would have been beneficial for Soleimani et al. to not include nitrogen atoms in the gate dielectric of the N-channel transistors because it can result in detrimental effects. This would have resulted in gate dielectric of the n-channel transistor having a different composition from the gate dielectric of the p-channel transistor because the n-channel transistor would not have contained the nitrogen atoms.

Soleimani et al. does not explicitly teach the concentration of nitrogen atoms in the p-type transistors at one elevation is 0.1% to 10.0% molar. It would have been a matter of obviousness to one having ordinary skill in the art to find the optimal concentration of nitrogen through routine experimentation (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955))

Soleimani et al. does not teach integrated circuitry, wherein the nitrogen atoms are higher in concentration at a first elevational location in the gate oxide as compared to a second elevational location located below the first elevational location. It is seen as a matter of obvious design choice to locate the high concentration area of nitrogen atoms at a location of choice between the substrate and the boron containing gate, since there is no evidence of new or unexpected results obtained by moving the high concentration area around in the oxide.

Regarding claim 40, Soleimani et al. does not explicitly teach integrated circuitry, wherein the gate dielectric layers of the p-type FET's and the n-type FET's have different thicknesses. The thickness of the gate dielectric is a known variable that is subject to adjusting in order to help control the threshold voltage. It would have been a matter of obvious design choice to alter the thickness of the gate dielectrics for different types of FET's to suit performance requirements. Additionally, it is known in the art that nitrogen atoms retard the growth of oxide layers. The incorporation of nitrogen into one of the gate dielectrics and not the other would have inherently resulted in a thinner gate dielectric.

Regarding claims 41 and 49, Soleimani et al. does not explicitly teach integrated circuitry, wherein the concentration of nitrogen atoms in the p-type transistors at one elevation is 0.1% to 10.0% molar. It would have been a matter of obviousness to one having ordinary skill in the art to find the optimal concentration of nitrogen through routine experimentation.

Regarding claims 42 and 44, Soleimani et al. teaches integrated circuitry, wherein one elevational location is proximate an interface of the gate dielectric and the substrate.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 38-49 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-7 of U.S. Patent No. 6,417,546. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-7 of the patent recite each and every limitation of the claims in the instant application.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Application/Control Number: 10/087,416

Art Unit: 2811

Page 6

DWO

July 11, 2002

Steven Loke